

In the ClaimsWe claim:

1. A low void pressure swing adsorption system wherein flow movement and pressure pulse are influenced from the same pressure source comprised of:

(a) at least one hermetically sealed vessel containing an adsorbent bed with at least one inlet coupled to the adsorbent bed by way of an inlet header and at least one outlet coupled to the adsorbent bed by way of an outlet header;

(b) wherein the inlet header and the outlet header of each vessel have a combined volume of less than 20% of the volume of the adsorbent bed of said vessel; and,

(c) wherein each inlet is coupled with at least one pressure source.

2. The low void pressure swing adsorption system of Claim 1, wherein the inlet header and the outlet header of each vessel have a combined volume of less than 10% of the volume of the adsorbent bed of said vessel.

23. The low void pressure swing adsorption system of Claim 1, wherein the inlet header and the outlet header of said vessel have a combined volume of less than 5% of the volume of the adsorbent bed of said vessel.

234. The low void pressure swing adsorption system of Claim 1, wherein said adsorbent bed is selected from

the group consisting of flat header beds, segmented beds, and vertical beds.

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5. The low void pressure swing adsorption system of Claim 1, wherein at least one pressure source is a high pressure source.

6. The low void pressure swing adsorption system of Claim 1, wherein at least one pressure source is a low pressure sink.

7. A low void pressure swing adsorption system wherein flow movement and pressure pulse are influenced from the same pressure source comprised of:

(a) at least one hermetically sealed vessel containing a radial adsorbent bed with more than one inlet coupled to the radial adsorbent bed by way of an inlet header and at least one outlet coupled to the radial adsorbent bed by way of an outlet header;

(b) wherein the inlet header and the outlet header of each vessel have a combined volume of less than 50% of the volume of the radial adsorbent bed of said vessel; and,

(c) wherein at least one pressure source is mounted proximate to each inlet.

8. The low void pressure swing adsorption system of Claim 7, wherein to at least one pressure source is a high pressure source.

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9. The low void pressure swing adsorption system of Claim 7, wherein at least one pressure source is a low pressure sink.

10. The low void pressure swing adsorption system of Claim 7, wherein the inlet header and the outlet header of said vessel have a combined volume of less than 20% of the volume of the radial adsorbent bed of each vessel.

11. A low void pressure swing adsorption system wherein flow movement and pressure pulse are influenced from the same pressure source comprised of:

(a) at least one hermetically sealed vessel containing an adsorbent bed with at least one inlet coupled to the adsorbent bed by way of an inlet header and at least one outlet coupled to the adsorbent bed by way of an outlet header;

(b) wherein the inlet header and the outlet header of each vessel have a combined volume of less than 50% of the volume of the adsorbent bed of said vessel;

(c) wherein each inlet has a valve mounted proximate to said vessel; and,

(d) wherein each valve shares a common pressure source.

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12. The low void pressure swing adsorption system of Claim 11, wherein said common pressure source is a high pressure source.

78/13. The low void pressure swing adsorption system of Claim 11, wherein said common pressure source is a low pressure sink.

89/14. The low pressure swing adsorption system of Claim 11, wherein the inlet header and the outlet header of each vessel have a combined volume of less than 20% of the volume of the adsorbent bed of each vessel.

910/15. The low void pressure swing adsorption system of Claim 11, wherein said adsorbent bed is selected from the group consisting of flat header beds, segmented beds, vertical beds, and radial beds.

Sub A7 16. The low void pressure swing adsorption system of Claim 11, wherein distribution pipes connect said valves to said high pressure source or said low pressure sink.

Sub B9 17. The low void pressure swing adsorption system of Claim 16, wherein said inlets share a high pressure source mounted to said valve and said distribution pipes are maintained at high pressure.

18. The low void pressure swing adsorption system of Claim 16, wherein said inlets share a low pressure sink mounted to said valve and said distribution pipes are maintained at low pressure.

1314/19. The low void pressure swing adsorption system of Claim 18, said distribution pipes have a total

14 ~~15~~ 20. The low void pressure swing adsorption system of Claim ~~11~~ <sup>65</sup>, wherein intermediary volumes are located between the pressure source and the inlet having a total volume less than 15% of the total volume of the adsorbent beds.

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